



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/745,074	12/20/2000	Nobuyuki Itoh	55506(840)	9273
21874	7590	05/08/2006	EXAMINER	
EDWARDS & ANGELL, LLP			RUDE, TIMOTHY L	
P.O. BOX 55874			ART UNIT	
BOSTON, MA 02205			PAPER NUMBER	

2883

DATE MAILED: 05/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/745,074

Applicant(s)

ITOH ET AL.

Examiner

Timothy L. Rude

Art Unit

2883

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,7,8 and 10-17 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,7,8,10-15 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 17 March 2006 has been entered.

Claims

Claims 1, 4, 7, 10, and 15-17 are amended. Claims 5-6 and 9 are canceled.

Election/Restrictions

Newly submitted claims 4 and 16 are directed to an invention that is independent or distinct from the invention originally elected for the following reasons:

Applicant elected species B, drawn to device per Figure 4A, example 4, on 16 January 2003.

Newly amended claims 4 and 16 are drawn to structural limitations that are mutually exclusive to the structure of example 4 as illustrated in Figure 4A. Figure 4A has only 2 volume excluding members.

Since applicant has received an action on the merits for the originally presented and elected species B, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 4 and 16 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Applicant may file a Divisional to pursue alternate species of the invention.

Claim Objections

Claims 1, 7, 15, and 17 are objected to because of the following informalities: Newly added limitations are confusing relative elected species B. Please more clearly limit to the structure as illustrated in Figure 4A. Appropriate correction is required. For examination purposes, claims 1, 7, 15, and 17 are considered to paraphrase prior claim language.

The opposite side edge is considered to be only that portion of the edge that is directly opposite the volume excluding member. The new claim language is considered to read on Applicant's Figure 4A, and the new claim language is considered to read on the applied prior art.

Claim Rejections - 35 USC § 103

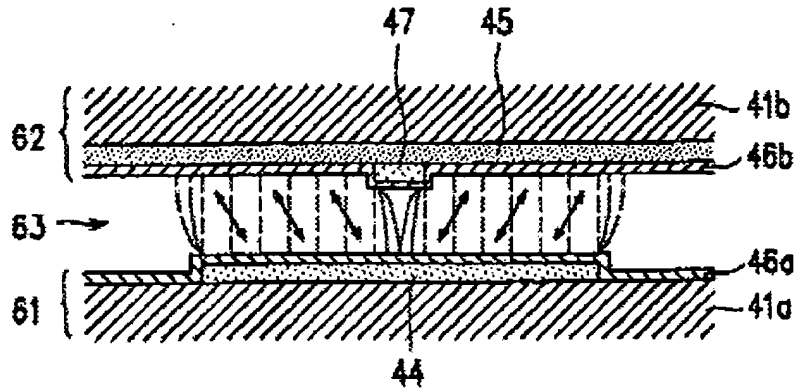
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirata et al (Hirata) USPAT 5,872,611 in view of Colgan et al (Colgan) USPAT 6,256,080 B1.

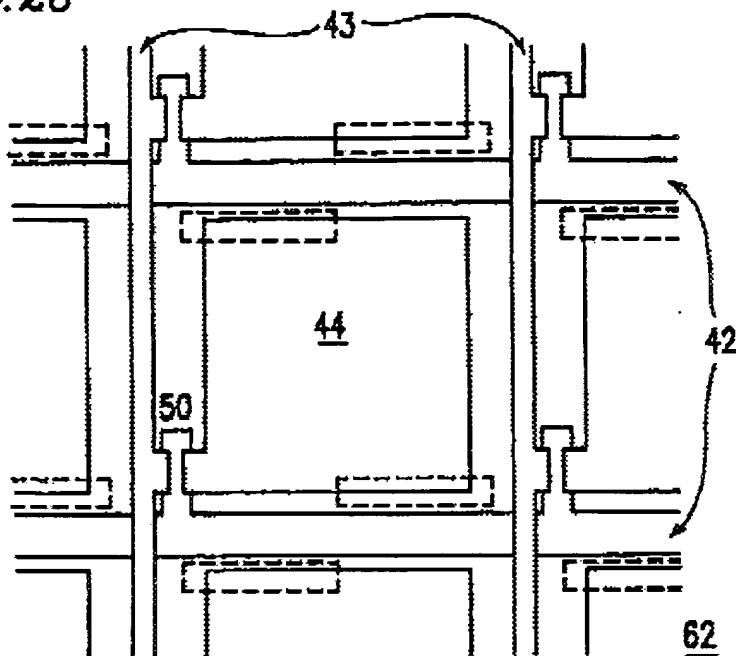
As to claims 1 and 15, Hirata discloses in example 10, (col. 18, line 21 through col. 20, line 10) and in related example 11, (col. 20, line 13 through col. 22, line 12, especially col. 20, lines 46-55), Figures 22-30, a liquid crystal display apparatus comprising: a pair of substrates, 41a and 41b, opposing each other with at least one electrode, 44 and 45, provided on both of the substrates; a liquid crystal layer, 63, interposed between the pair of substrates; the at least one electrode being used for applying an electric field across the liquid crystal layer; and at least one volume excluding member that is provided on opposite edges of the at least one electrode but are not opposite each other [low-permittivity insulating film, 47, Figure 27, and dotted rectangles in Figure 26], wherein:

FIG. 27



at a second state at which voltage is applied, the liquid crystal molecules are tilted in a uniform direction such that said liquid crystal molecules are tilted away from the at least volume excluding member of the at least one electrode to an opposite edge when a voltage is applied to the at least one electrode (per double-headed arrows in Figures 22 and 27, col. 19, lines 9-19).

FIG. 26

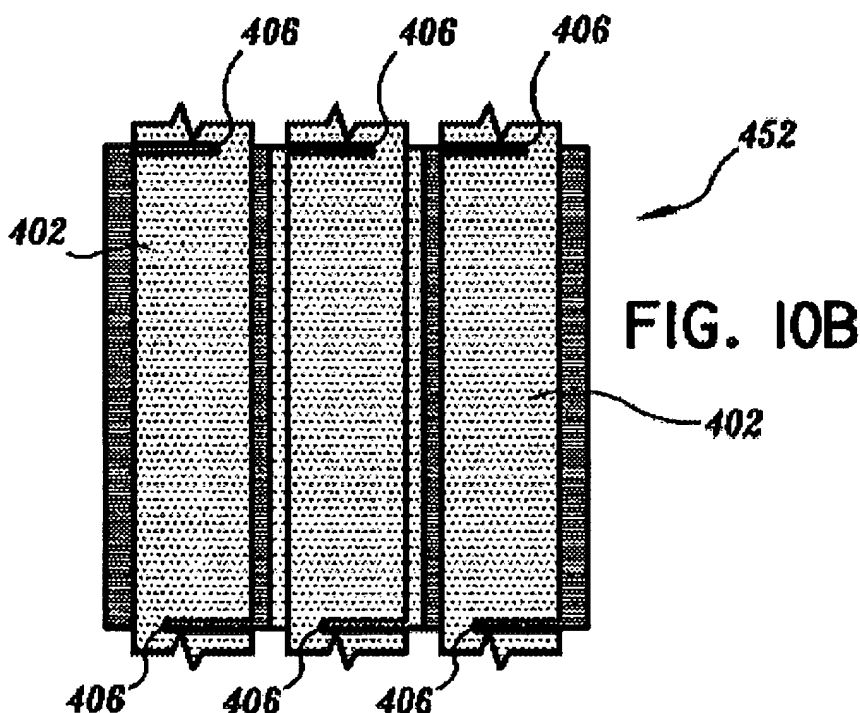


Hirata discloses zero tilt angle (col. 19, lines 1-8), which is parallel alignment that indicates positive dielectric anisotropy, given the molecular alignments indicated in Figures 22 and 27.

Hirata does not explicitly disclose a liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy and a side of each of the pair of substrates facing the liquid crystal layer subjected to a vertical alignment treatment.

Hirata does not explicitly disclose vertical alignment mode of operation comprising non-twisted or non-bended liquid crystal molecules, however, Hirata teaches that his invention, although disclosed in TN mode, is applicable to other modes of operation (col. 23, lines 60-67).

Colgan teaches the use of homeotropic alignment (Applicant's vertical alignment treatments) (col. 9, lines 50-55) and liquid crystal material with negative dielectric anisotropy (col. 7, lines 33-38) in a display with gaps, notches, or ridges, 406 (col. 12, lines 38-47), to comprise a display with an improved wide viewing angle (Abstract).



Colgan is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy and a side of each of the pair of substrates facing the liquid crystal layer subjected to a vertical alignment treatment to comprise a display with improved wide viewing angle.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hirata with the liquid crystal layer containing liquid crystal molecules having a negative dielectric

anisotropy and a side of each of the pair of substrates facing the liquid crystal layer subjected to a vertical alignment treatment of Colgan to comprise a display with improved wide viewing angle.

Please note that the combination of Colgan to Hirata would meet Applicant's enabling disclosure thereby necessarily meeting Applicant's claimed performance recitations. Please also note that changing to the liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy of Colgan would reverse the tilt of the LC molecules to be opposite that shown in Figure 27 of Hirata [likes repel, unlikes attract, well known].

As to claim 2, Hirata discloses a volume excluding member comprising a protrusion, 47, above.

2. Claims 7, 8, 10-14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirata in view of Colgan, as applied to claims 1-6 above, and further in view of Numano et al (Numano) USPAT 6,313,898 B1.

As to claims 7, 13, 14, and 17, Hirata in view of Colgan disclose the liquid crystal display as comprised above such that when voltage is not applied to the at least one electrode, the liquid crystal molecules in the at least one pixel portion are oriented in a vertical alignment.

Hirata in view of Colgan do not explicitly disclose that the liquid crystal molecules in the non-pixel portion are oriented in a uniaxial horizontal alignment by subjecting a vertical alignment film to an irradiation of selectively polarized ultraviolet rays, wherein a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion.

Numano teaches in Embodiment 3 (col. 11, line 35 through col. 12, line 5) and Figures 11(a)-11(c) the use of polarized ultraviolet light to weaken the strength of the alignment layer (reducing the vertical alignment to become more horizontal in alignment) in the region between pixels to reduce cross talk and allow for a higher aperture ratio (col. 12, lines 3-5). The teachings and motivation of Numano expressed in 10 embodiments are considered to be robust to suggest the claimed invention to those having ordinary skill in the art of liquid crystals. Also, providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion would be obvious to those having ordinary skill in the art of liquid crystals to prevent light leaks and thereby improve contrast.

FIG. 11(a)

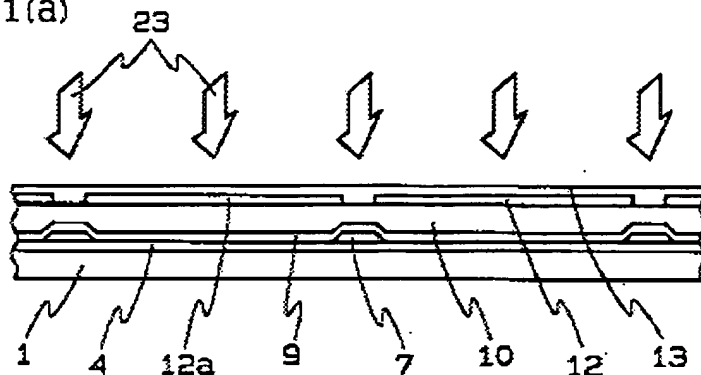


FIG. 11(b)

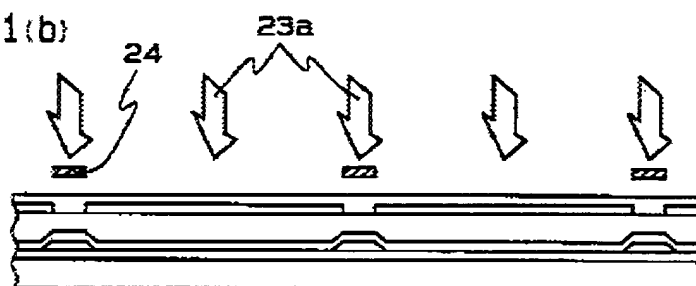
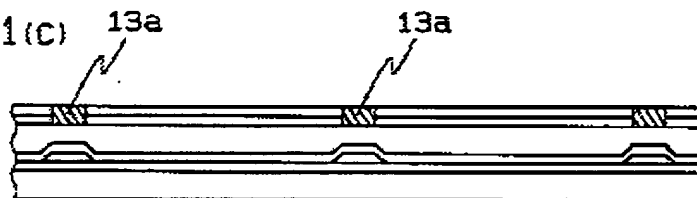


FIG. 11(c)



Numano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to make the liquid crystal molecules in the non-pixel portion oriented in a uniaxial horizontal alignment by subjecting the existing vertical alignment film to an irradiation of selectively polarized ultraviolet rays providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the

liquid crystal molecules in the non-pixel portion to reduce cross talk and allow for a higher aperture ratio and to prevent light leaks and thereby improve contrast.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Hirata in view of Colgan with the liquid crystal molecules in the non-pixel portion oriented in a uniaxial horizontal alignment by subjecting the vertical alignment film to an irradiation of selectively polarized ultraviolet rays providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion of Numano to reduce cross talk and allow for a higher aperture ratio and to prevent light leaks and thereby improve contrast.

Please note that the combination of Numano and Colgan to Hirata would meet Applicant's enabling disclosure thereby necessarily meeting Applicant's claimed performance recitations. Please also note that changing to the liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy of Colgan would reverse the tilt of the LC molecules to be opposite that shown in Figure 27 of Hirata [likes repel, un-likes attract, well known].

As to claim 8, Hirata discloses in example 10, (col. 18, line 21 through col. 20, line 10) and in related example 11, (col. 20, line 13 through col. 22, line 12), Figures 22-30, a liquid crystal display apparatus according to claim 7, wherein the liquid crystal molecules in the at least one pixel portion are oriented in a horizontal alignment so as to

be tilted in a uniform direction when a voltage is applied to the at least one electrode (per Figures 22 and 27).

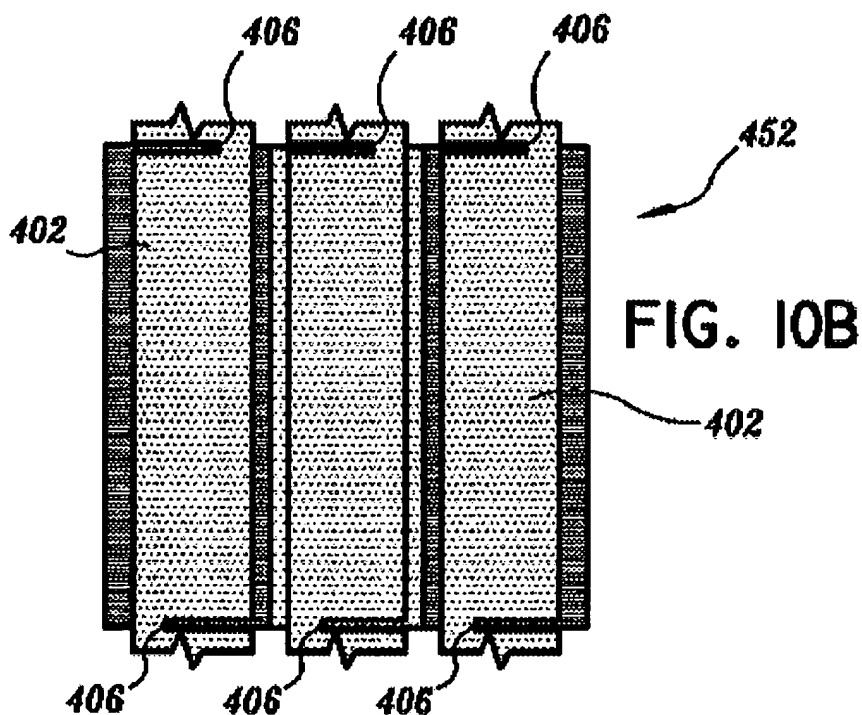
As to claim 10, Hirata discloses a volume excluding member, 47, is formed on a portion of the at least one electrode wherein said volume excluding member comprises a protrusion.

As to claim 11, Hirata discloses in example 10 a side of the at least one of the pair of substrates facing the liquid crystal layer is subjected to a rubbing treatment (col. 19, line 1). Furthermore, Colgan teaches in the Background of the Invention, the alignment of the LC molecules of the homeotropic cells is typically provided by rubbing alignment layers (col. 3, lines 13-16).

As to claim 12, Hirata discloses in Example 11, a liquid crystal display apparatus, wherein the at least one electrode comprises a comb electrode (col. 21, lines 46-59).

3. Claims 1, 2, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan et al (Colgan) USPAT 6,256,080 B1 in view of Hirata et al (Hirata) USPAT 5,872,611.

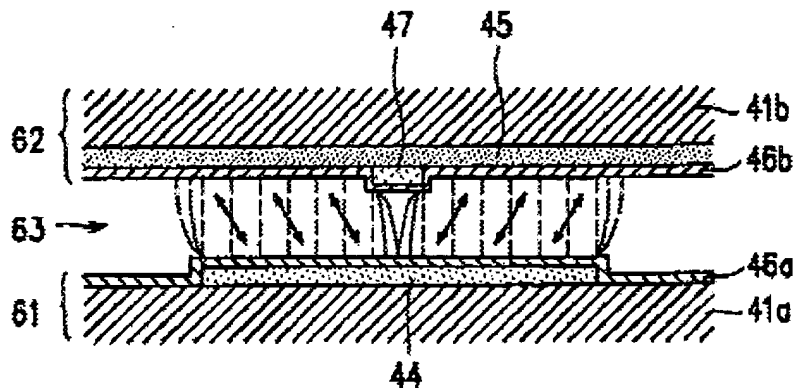
As to claims 1 and 15, Colgan teaches the use of homeotropic alignment (Applicant's vertical alignment treatments) (col. 9, lines 50-55) and liquid crystal material with negative dielectric anisotropy (col. 7, lines 33-38) in a display with gaps, notches, or ridges, 406 (col. 12, lines 38-47), to comprise a display with an improved wide viewing angle (Abstract).



Colgan does not explicitly disclose one of the at least one volume excluding member is provided on the at least one electrode on at least one of the pair of substrates, the volume excluding member being provided so as to be on at least a portion of one side edge of the at least one electrode; and the liquid crystal molecules are tilted in a uniform direction from the at least one side edge of the at least one electrode to an opposite edge when a voltage is applied to the at least one electrode.

Hirata teaches in example 10, (col. 18, line 21 through col. 20, line 10) and in related example 11, (col. 20, line 13 through col. 22, line 12), Figures 22-30, a liquid crystal display apparatus comprising: a pair of substrates, 41a and 41b, opposing each other; a liquid crystal layer, 63, interposed between the pair of substrates; at least one electrode, 44 and 45, provided on each of the pair of substrates, the at least one electrode being used for applying an electric field across the liquid crystal layer; and at least one low-permittivity insulating film, 47 (Applicant's volume excluding member), wherein:

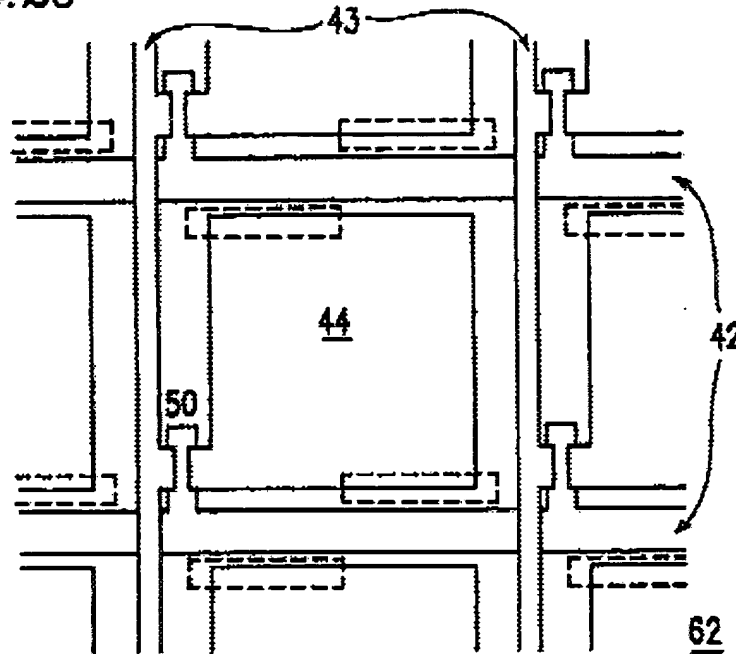
FIG. 27



one of the at least one volume excluding member is provided on the at least one electrode on at least one of the pair of substrates, the volume excluding member being provided so as to be on at least a portion of one side edge of the at least one electrode (dashed rectangles in Figure 26); and the liquid crystal molecules are tilted in a uniform direction from the at least one side edge of the at least one electrode to an opposite

Art Unit: 2883

edge when a voltage is applied to the at least one electrode (per double-headed arrows in Figures 22 and 27, col. 19, lines 9-19) to improve viewing angle performance.

FIG. 26

Hirata is evidence that workers of ordinary skill in the art would find the reason, suggestion, or motivation to add the claimed volume excluding members to improve viewing angle performance.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Cogan with the volume excluding members per Hirata to improve viewing angle performance.

Please note that the combination of Colgan to Hirata would meet Applicant's enabling disclosure thereby necessarily meeting Applicant's claimed performance recitations. Please also note that changing to the liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy of Colgan would reverse the tilt of the LC molecules to be opposite that shown in Figure 27 of Hirata [likes repel, unlikes attract, well known].

As to claim 2, Hirata, as combined to Colgan above, discloses a volume excluding member comprising a protrusion, 47, above.

4. Claims 7, 8, 10-14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Colgan in view of Hirata, as applied to claims 1-6 above, and further in view of Numano et al (Numano) USPAT 6,313,898 B1.

As to claims 7, 13, 14, and 17, Colgan in view of Hirata disclose the liquid crystal display as comprised above such that when voltage is not applied to the at least one electrode, the liquid crystal molecules in the at least one pixel portion are oriented in a vertical alignment.

Colgan in view of Hirata do not explicitly disclose that the liquid crystal molecules in the non-pixel portion are oriented in a uniaxial horizontal alignment by subjecting a vertical alignment film to an irradiation of selectively polarized ultraviolet rays, wherein a

direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion.

Numano teaches in Embodiment 3 (col. 11, line 35 through col. 12, line 5) and Figures 11(a)-11(c) the use of polarized ultraviolet light to weaken the strength of the alignment layer (reducing the vertical alignment to become more horizontal in alignment) in the region between pixels to reduce cross talk and allow for a higher aperture ratio (col. 12, lines 3-5). The teachings and motivation of Numano expressed in 10 embodiments are considered to be robust to suggest the claimed invention to those having ordinary skill in the art of liquid crystals. Also, providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion would be obvious to those having ordinary skill in the art of liquid crystals to prevent light leaks and thereby improve contrast.

FIG. 11(a)

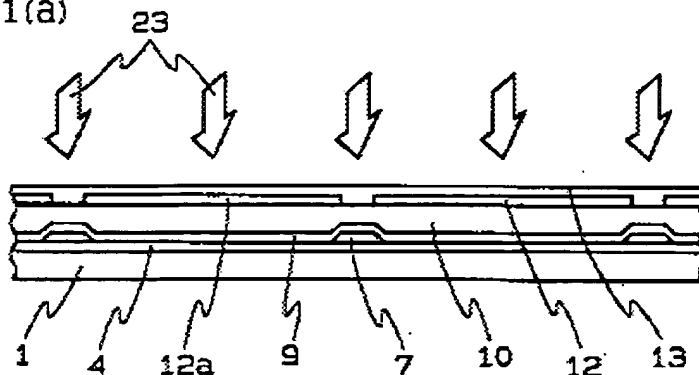


FIG. 11(b)

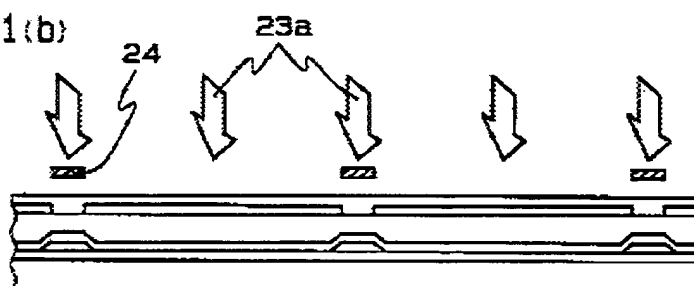
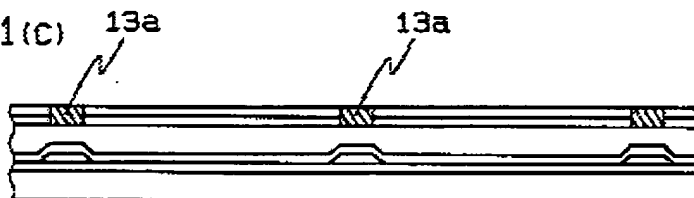


FIG. 11(c)



Numano is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to make the liquid crystal molecules in the non-pixel portion oriented in a uniaxial horizontal alignment by subjecting the existing vertical alignment film to an irradiation of selectively polarized ultraviolet rays providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the

liquid crystal molecules in the non-pixel portion to reduce cross talk and allow for a higher aperture ratio and to prevent light leaks and thereby improve contrast.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Colgan in view of Hirata with the liquid crystal molecules in the non-pixel portion oriented in a uniaxial horizontal alignment by subjecting the vertical alignment film to an irradiation of selectively polarized ultraviolet rays providing a direction of the horizontal alignment of the liquid crystal molecules in the at least one pixel portion is substantially identical to a direction of uniaxial horizontal alignment of the liquid crystal molecules in the non-pixel portion of Numano to reduce cross talk and allow for a higher aperture ratio and to prevent light leaks and thereby improve contrast.

Please note that the combination of Colgan to Hirata would meet Applicant's enabling disclosure thereby necessarily meeting Applicant's claimed performance recitations. Please also note that changing to the liquid crystal layer containing liquid crystal molecules having a negative dielectric anisotropy of Colgan would reverse the tilt of the LC molecules to be opposite that shown in Figure 27 of Hirata [likes repel, unlikes attract, well known].

As to claim 8, Hirata, as combined to Colgan above, discloses in example 10, (col. 18, line 21 through col. 20, line 10) and in related example 11, (col. 20, line 13 through col. 22, line 12), Figures 22-30, a liquid crystal display apparatus according to claim 7, wherein the liquid crystal molecules in the at least one pixel portion are oriented

in a horizontal alignment so as to be tilted in a uniform direction when a voltage is applied to the at least one electrode (per Figures 22 and 27).

As to claim 10, Hirata, as combined to Colgan above, discloses a volume excluding member, 47, is formed on a portion of the at least one electrode wherein said volume excluding member comprises a protrusion.

As to claim 11, Hirata, as combined to Colgan above, discloses in example 10 a side of the at least one of the pair of substrates facing the liquid crystal layer is subjected to a rubbing treatment (col. 19, line 1). Furthermore, Colgan teaches in the Background of the Invention, the alignment of the LC molecules of the homeotropic cells is typically provided by rubbing alignment layers (col. 3, lines 13-16).

As to claim 12, Hirata, as combined to Colgan above, discloses in Example 11, a liquid crystal display apparatus, wherein the at least one electrode comprises a comb electrode (col. 21, lines 46-59).

Response to Arguments

5. Applicant's arguments filed on 17 March 2006 have been fully considered but they are not persuasive.

Applicant's ONLY arguments are as follows:

- (1) None of the references teach the newly added limitations.
- (2) Dependent claims are allowable because they directly or indirectly depend from an allowable base claim.

Examiner's responses to Applicant's ONLY arguments are as follows:

(1) It is respectfully pointed out that newly added limitations are confusing relative elected species B. Please more clearly limit to the structure as illustrated in Figure 4A. Appropriate correction is required. For examination purposes, claims 1, 7, 15, and 17 are considered to paraphrase prior claim language.

The opposite side edge is considered to be only that portion of the edge that is directly opposite the volume excluding member. The new claim language is considered to read on Applicant's Figure 4A, and the new claim language is considered to read on the applied prior art.

As to claims 4 and 16, they are withdrawn due to being drawn to non-elected species of the claimed invention.

(2) It is respectfully pointed out that in so far as Applicant has not argued rejection(s) of the limitations of dependent claim(s), Applicant has acquiesced said rejection(s).

Conclusion

Applicant's amendment is considered a *bona fide* attempt to advance prosecution, so, as a courtesy, examiner chooses to not make this a First Action Final Rejection [MPEP 706.07(b)].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L. Rude whose telephone number is (571) 272-2301. The examiner can normally be reached on Mon-Thurs.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



tlr

Timothy L Rude
Examiner
Art Unit 2883



Frank G. Font
Supervisory Patent Examiner
Technology Center 2800